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RTD UPDATES: Pest Management

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Integrated Pest Management Practices on 1991 Fruits and Nuts

- Half of the 1991 U.S. acreage in fruits and nuts was under integrated pest management (IPM), which includes the use of professional pest scouting and economic thresholds to make pesticide treatment decisions.
- Nearly 90 percent of the acreage under IPM was also treated with additional alternative pest management practices. Frequently reported practices were field sanitation, pruning and canopy management, pheromones, and water management.
- About 8 percent of total fruit and nut acres received no pesticide applications. Acres not treated ranged from 0 in several crops to 40 percent of California avocado acres.

Integrated Pest Management (IPM) is a sustainable approach to managing pests that combines biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. Last fall, the USDA announced a goal to increase the adoption of IPM to 75 percent of U.S. crop acres by the year 2000. This issue of RTD UPDATES summarizes information on the adoption of IPM in the production of fruits and nuts. To practice IPM, growers need to scout their fields and use economic thresholds to make pesticide treatment decisions.

About RTD UPDATES

RTD UPDATES is a semimonthly series featuring data relating to agricultural resources, the environment, food safety, and technology. These UPDATES report recent data from surveys of farm operators and others knowledgeable about changing agricultural resource conditions, with only minimal interpretation or analysis. Please contact the individual listed at the end of the text for additional information about the data in this UPDATE. If you would like to be added to the mailing list or have other questions about RTD UPDATES, contact Richard Magleby, (202) 219-0436.

Many also employ a number of alternative practices such as beneficial organisms, pheromones, planting trap crops or pest resistant varieties, and adjusting planting locations and water use to manage pests.

The tables in this UPDATE provide State and crop level statistics related to IPM adoption compiled from the 1991 USDA Fruit and Nut Chemical Use Survey. The survey targeted 30 crops in 13 States, accounting for most of the U.S. acreage in major fruit and nut crops (see table).

Survey Coverage, Fruit and Nut Chemical Use Survey, 1991

Crops 1/	Number of States	Percent of U.S. acres
Apples	11	82
Avocados	2	100
Blueberries	4	*
Grapefruit	3	97
Grapes	8	99
Lemons	2	99
Oranges (except temples)	3	100
Peaches	10	79
Pears	4	95
Plums and prunes	4	100
Raspberries	3	*
Sweet cherries	4	99
Tangelos	3	100
Tangerines	3	70
Tart cherries	4	100

1/ Excludes crops surveyed in only one State (nut crops, apricots, blackberries, dates, figs, kiwifruit, limes, nectarines, olives, pomegranates, temple oranges). Results for these crops are included in a separate report titled Adoption of Integrated Pest Management in U.S. Agriculture (AIB-707), by Ann Vandeman, Jorge Fernandez-Cornejo, Sharon Jans, and Biing-Hwan Lin.

*No. U.S. acreage estimate available for 1991.

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Composed by Barbara Smith.

About IPM

Integrated pest management (IPM) is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks.

Information is a fundamental component of IPM for two reasons. First, because an understanding of the agricultural ecosystem is essential to preventing pest problems. Second, because IPM relies upon close monitoring of pest populations in order to determine when a population has reached an economically damaging threshold.

Economic thresholds are developed from research that takes three main factors into account: the physical damage caused by the presence of the pest at a known level of infestation, the revenue losses resulting from that damage, and the costs of treatment. **Scouting** is the primary method of monitoring pest populations to determine if an economic threshold is reached. It refers to the periodic and systematic sampling of pests in the field in order to estimate population levels. Computer models based on weather conditions and other factors are used also to predict the onset and severity of a pest outbreak. Monitoring is employed in tracking populations of beneficials as well as pests.

With IPM, no single material or practice is relied upon where multiple tactics are available to manage a pest problem. Thus, although synthetic pesticides may be one of the treatments used, they will not be the only form of treatment. In particular, IPM attempts to use:

Biological controls: natural enemies, often called "beneficials," which include parasites, predators, and insect pathogens; semiochemicals, including pheromones and feeding attractants; and biopesticides.

Cultural controls: cultivation, mulching, water management, field sanitation, crop rotation, and pruning/canopy management.

Strategic controls: trap crops which attract the pests away from the crop susceptible to pest damage, and adjusting planting location, planting date, and timing of harvest.

Host plant resistance: pest-resistant plant varieties and root stock.

Chemical controls also are part of IPM, but the use of pesticides in IPM differs from that under a conventional pest control program. Where possible, IPM relies on pesticides which target specific pests, can be used at lower rates, and are less toxic to beneficial organisms. New application methods are being developed that employ biological materials such as pheromones and feeding attractants to lure the target pest to the pesticide. Application rates, timing and frequency are chosen to minimize effects on beneficials, and pesticides that substitute for each other are interchanged to slow pest resistance.

Table 1--Use of an "IPM approach" on fruits, by State and crop, 1991

State	Crop	Did not apply pesticides	No IPM	IPM			
				Low 1/	Medium 2/	High 3/	All
Percent of bearing acres							
Arizona	Apples	22	53	0	2	24	26
Arizona	Grapefruit	17	65	18	1	0	19
Arizona	Lemons	0	97	1	1	0	2
Arizona	Oranges	6	74	20	0	0	20
Arizona	Tangelos	4	82	14	0	0	14
California	Apples	26	32	0	18	24	42
California	Avocados	40	20	4	17	19	40
California	Grapes	7	35	6	11	40	57
California	Peaches	3	49	2	21	24	47
California	Pears	7	28	6	14	46	66
California	Plums and prunes	9	56	2	15	18	35
California	Grapefruit	11	41	13	14	21	48
California	Lemons	2	16	4	64	14	82
California	Oranges	7	18	5	18	51	74
California	Tangelos	26	22	0	25	27	52
California	Tangerines	12	17	37	16	17	70
California	Sweet cherries	9	26	0	30	35	65
Florida	Avocados	2	97	0	2	0	2
Florida	Grapefruit	0	33	16	29	21	66
Florida	Oranges	0	40	17	26	16	59
Florida	Tangelos	0	41	12	35	12	59
Florida	Tangerines	6	15	28	36	15	79
Michigan	Apples	0	46	2	27	25	54
Michigan	Blueberries	1	68	4	11	17	32
Michigan	Grapes	0	66	3	29	2	34
Michigan	Peaches	0	48	9	25	18	52
Michigan	Plums and prunes	0	51	2	31	16	49
Michigan	Raspberries	2	67	0	14	17	31
Michigan	Sweet cherries	0	75	0	10	14	24
Michigan	Tart cherries	0	63	3	17	17	37
New York	Apples	0	41	1	20	39	60
New York	Grapes	1	80	1	6	12	19
New York	Peaches	0	43	3	35	19	57
New York	Pears	0	41	3	40	16	59
New York	Tart cherries	0	37	5	26	32	63
North Carolina	Apples	0	88	0	1	11	12
North Carolina	Peaches	0	98	0	1	1	2
Oregon	Apples	0	81	0	1	18	19
Oregon	Grapes	20	77	0	1	2	3
Oregon	Plums and prunes	6	90	0	0	4	4
Oregon	Raspberries	2	95	0	2	2	4
Oregon	Sweet cherries	1	91	0	3	6	9
Pennsylvania	Apples	0	37	1	13	49	63
Pennsylvania	Peaches	0	44	2	22	33	57
Pennsylvania	Tart cherries	0	31	2	12	56	70
South Carolina	Apples	0	72	0	0	28	28
South Carolina	Peaches	0	99	0	1	0	01
Virginia	Apples	1	32	1	3	64	68
Virginia	Peaches	0	52	2	3	43	48
Washington	Apples	0	68	2	12	18	32
Washington	Grapes	7	57	7	8	21	36
Washington	Peaches	4	64	14	7	11	32
Washington	Pears	0	64	3	12	21	36
Washington	Plums and prunes	0	76	4	11	9	24
Washington	Raspberries	2	59	0	2	37	39
Washington	Sweet cherries	0	61	5	21	14	40
Total 4/		8	42	6	17	27	50

1/ Defined as the use of professional scouting and economic thresholds to determine pesticide application decisions, and no additional alternative practices used to control pests (possible practices are beneficials, resistant varieties, pheromones, trap crops, pruning/canopy management, field sanitation, planting locations, and water management practices.)

2/ Low IPM plus 1-2 additional alternative pest control practices.

3/ Low IPM plus 3 or more additional alternative pest control practices.

4/ Total includes all surveyed fruit and nut crops and States, some of which are not listed in the table.

Source: NASS/ERS 1991 Fruit and Nut Chemical Use Survey.

Table 2--Use of professional scouting on fruits, by State and crop, 1991

State	Crop	Any professional scouting	Professional scouting for:		
			Insects	Diseases	Weeds
Percent of bearing acres					
Arizona	Apples	47	46	46	44
Arizona	Grapefruit	35	34	27	23
Arizona	Lemons	59	59	19	7
Arizona	Oranges	40	40	31	25
Arizona	Tangelos	36	36	18	16
Californnia	Apples	53	53	52	40
California	Avocados	52	52	47	37
California	Grapes	73	73	68	63
California	Peaches	81	81	77	73
California	Pears	68	68	64	56
California	Plums and prunes	78	77	72	70
California	Grapefruit	63	62	37	28
California	Lemons	85	85	80	64
California	Oranges	85	85	76	55
California	Tangelos	52	52	52	17
California	Tangerines	75	75	27	27
CaLIFORNIA	Sweet cherries	80	80	73	74
Florida	Avocados	10	10	8	6
Florida	Grapefruit	90	89	78	77
Florida	Oranges	72	72	68	64
Florida	Tangelos	72	72	72	72
Florida	Tangerines	85	85	85	81
Michigan	Apples	66	66	62	37
Michigan	Blueberries	65	64	57	20
Michigan	Grapes	46	45	45	42
Michigan	Peaches	65	62	59	45
Michigan	Plums and prunes	68	64	64	33
Michigan	Raspberries	53	43	46	40
Michigan	Sweet cherries	43	43	42	28
Michigan	Tart cherries	53	53	50	36
New York	Apples	66	66	66	61
New York	Grapes	32	30	28	26
New York	Peaches	73	75	71	58
New York	Pears	71	71	66	67
New York	Tart cherries	67	67	67	58
North Carolina	Apples	27	23	27	20
North Carolina	Peaches	3	3	3	2
Oregon	Apples	28	28	27	25
Oregon	Grapes	6	3	3	4
Oregon	Plums and prunes	5	5	5	5
Oregon	Raspberries	10	8	10	8
Oregon	Sweet cherries	10	10	10	9
Pennsylvania	Apples	74	73	74	69
Pennsylvania	Peaches	74	74	73	67
Pennsylvania	Tart cherries	77	77	77	69
South Carolina	Apples	66	66	66	38
South Carolina	Peaches	27	27	26	22
Virginia	Apples	75	75	75	62
Virginia	Peaches	56	56	56	44
Washington	Apples	44	44	44	40
Washington	Grapes	42	38	38	33
Washington	Peaches	42	41	42	41
Washington	Pears	57	57	56	53
Washignton	Plums and prunes	27	27	24	17
Washington	Raspberries	52	51	52	40
Washington	Sweet cherries	52	52	51	45
Total 1/		65	65	61	54

1/ Total includes all surveyed fruit and nut crops and States, some of which are not listed in the table.

Source: NASS/ERS 1991 Fruit and Nut Chemical Use Survey.

Table 3--Pesticide application decision criteria for professionally scouted fruit acreage, by State and crop, 1991

State	Crop	Predetermined schedule	Economic thresholds	Contract 1/ requirements	Other
Percent of scouted acres					
Arizona	Apples	0	71	0	29
Arizona	Grapefruit	2	70	0	29
Arizona	Lemons	0	4	0	96
Arizona	Oranges	2	54	0	44
Arizona	Tangelos	5	38	0	57
California	Apples	5	81	3	11
California	Avocados	1	77	0	22
California	Grapes	9	80	0	11
California	Peaches	9	59	0	33
California	Pears	2	96	2	0
California	Plums and prunes	5	44	0	51
California	Grapefruit	1	76	10	31
California	Lemons	2	97	0	1
California	Oranges	5	87	0	7
California	Tangelos	1	99	0	0
California	Tangerines	5	95	0	0
California	Sweet cherries	12	81	1	6
Florida	Avocados	71	16	2	12
Florida	Grapefruit	24	75	0	1
Florida	Oranges	13	8	3	0
Florida	Tangelos	19	81	0	0
Florida	Tangerines	7	93	0	0
Michigan	Apples	9	82	0	9
Michigan	Blueberries	33	49	3	15
Michigan	Grapes	17	74	4	5
Michigan	Peaches	12	79	0	9
Michigan	Plums and prunes	19	72	0	9
Michigan	Raspberries	37	58	0	4
Michigan	Sweet cherries	26	57	0	18
Michigan	Tart cherries	22	69	0	9
New York	Apples	0	91	0	8
New York	Grapes	13	60	1	26
New York	Peaches	2	84	0	14
New York	Pears	1	85	0	13
New York	Tart cherries	0	94	0	6
North Carolina	Apples	42	45	0	14
North Carolina	Peaches	25	75	0	0
Oregon	Apples	0	65	0	35
Oregon	Grapes	14	51	0	35
Oregon	Pears	0	18	0	82
Oregon	Plums and prunes	0	94	0	6
Oregon	Raspberries	32	32	0	36
Oregon	Sweet cherries	6	84	0	10
Pennsylvania	Apples	15	84	0	1
Pennsylvania	Peaches	14	76	0	10
Pennsylvania	Tart cherries	8	90	0	1
South Carolina	Apples	52	47	0	1
South Carolina	Peaches	66	6	3	25
Virginia	Apples	9	90	0	1
Virginia	Peaches	13	85	0	2
Washington	Apples	11	73	0	17
Washington	Grapes	7	86	0	7
Washington	Peaches	9	77	0	15
Washington	Pears	3	63	0	34
Washington	Plums and prunes	0	88	0	12
Washington	Raspberries	16	76	0	8
Washington	Sweet cherries	6	75	0	19
Total 2/		10	76	0	13

1/ Where pest management decisions are controlled by the processor, produce company, or other buyer with whom the producer has a contract for the commodity.

2/ Total includes all surveyed fruit and nut crops and States, some of which are not listed in the table.

Source: NASS/ERS 1991 Fruit and Nut Chemical Use Survey.

Table 4--Alternative pest management practices used on fruits, by State and crop, 1991

State	Crop	Beneficials	Resistant varieties	Pheromones	Pruning/ canopy management	Field sanitation	Planting locations	Water management	Trap crops 1/
Percent of bearing acres									
AZ	Apples	16	29	94	79	78	1	14	24
AZ	Grapefruit	30	6	14	17	16	2	2	10
AZ	Lemons	34	36	24	40	37	8	27	1
AZ	Oranges	25	21	13	23	23	5	14	8
AZ	Tangelos	20	14	7	9	1	14	0	74
CA	Apples	16	19	50	46	78	18	28	0
CA	Avacados	28	35	11	36	34	8	15	10
CA	Grapes	19	34	15	58	68	24	46	18
CA	Peaches	2	13	52	29	52	17	17	3
CA	Pears	30	34	63	70	72	40	49	1
CA	Plums and prunes	13	16	55	25	53	5	17	10
CA	Grapefruit	35	13	23	38	46	0	9	10
CA	Lemons	29	12	12	28	26	52	7	0
CA	Oranges	28	0	0	39	57	2	8	0
CA	Tangelos	0	8	49	24	52	0	3	13
CA	Tangerines	11	19	33	16	20	0	7	10
CA	Sweet cherries	14	35	38	38	80	4	31	2
FL	Avocados	9	0	0	24	30	14	19	1
FL	Grapefruit	39	31	28	35	23	1	43	5
FL	Oranges	18	22	11	38	41	8	29	3
FL	Tangelos	24	17	6	35	37	3	28	6
FL	Tangerines	7	26	5	19	30	5	31	0
MI	Apples	25	15	51	71	67	13	9	8
MI	Blueberries	13	33	51	45	49	2	8	11
MI	Grapes	5	3	5	26	50	3	1	2
MI	Peaches	18	12	32	60	71	11	4	5
MI	Plums and prunes	27	17	17	61	66	15	2	4
MI	Raspberries	18	23	11	62	62	19	17	6
MI	Sweet cherries	18	14	25	67	65	9	16	3
MI	Tart Cherries	16	13	32	68	65	12	12	8
NY	Apples	19	10	51	91	78	6	22	12
NY	Grapes	10	21	4	55	50	2	1	2
NY	Peaches	22	11	23	78	66	12	17	1
NY	Pears	11	7	18	86	80	12	21	2
NY	Tart cherries	31	0	45	76	38	0	3	3
NC	Apples	17	6	28	77	90	5	6	20
NC	Peaches	6	23	3	71	94	5	4	2
OR	Apples	21	15	73	76	69	12	36	10
OR	Grapes	3	8	3	60	47	1	5	1
OR	Pears	14	40	72	84	68	4	17	35
OR	Plums and prunes	6	6	22	58	67	10	15	0
OR	Raspberries	7	33	33	27	55	6	18	2
OR	Sweet cherries	18	20	24	54	60	4	13	3
PA	Apples	65	19	56	90	70	21	15	13
PA	Peaches	62	34	48	84	76	32	23	15
PA	Grapes	5	3	3	16	30	1	0	0
PA	Tart cherries	70	10	57	84	80	24	14	16
SC	Apples	16	32	31	81	99	1	27	2
SC	Peaches	13	13	5	55	89	11	8	0
VA	Apples	55	23	75	86	93	13	17	31
VA	Peaches	35	8	52	73	85	5	12	10
WA	Apples	19	18	83	61	67	5	29	8
WA	Grapes	4	3	4	35	45	0	24	12
WA	Peaches	17	9	47	40	46	2	17	11
WA	Pears	17	17	55	61	59	7	38	5
WA	Plums and prunes	9	8	18	38	25	5	8	2
WA	Raspberries	4	64	84	65	39	5	37	27
WA	Sweet cherries	14	9	22	36	61	8	14	10
Total 2/		19	22	37	47	60	11	31	9

1/ Crops planted to attract pests away from the crop susceptible to pest damage.

2/ Total includes all surveyed fruit and nuts crops and States, some of which are not listed in the table.

Source: NASS/ERS 1991 Fruit and Nut Chemical Use Survey.

Table 5--Number of alternative pest management practices used on fruits, by State and crop, 1991

State	Crop	Number of practices 1/			
		None	One	Two	Three or more
Percent of bearing acres					
Arizona	Apples	2	6	26	66
Arizona	Grapefruit	66	17	1	16
Arizona	Lemons	54	6	4	35
Arizona	Oranges	58	13	11	19
Arizona	Tangelos	70	14	10	7
California	Apples	13	16	26	45
California	Avocados	33	25	18	25
Califronia	Grapes	22	13	8	57
California	Peaches	22	27	20	31
California	Pears	9	17	19	55
California	Plums and prunes	13	37	24	26
California	Grapefruit	24	30	22	24
California	Lemons	6	55	13	26
California	Oranges	7	17	16	59
California	Tangelos	38	9	26	27
California	Tangerines	50	15	13	22
California	Sweet cherries	5	30	20	44
Florida	Avocados	56	19	10	14
Florida	Grapefruit	18	25	19	37
Florida	Oranges	26	27	23	24
Florida	Tangelos	19	40	26	16
Florida	Tangerines	38	28	19	15
Michigan	Apples	5	14	37	44
Michigan	Blueberries	13	28	23	36
Michigan	Grapes	39	34	25	2
Michigan	Peaches	12	23	30	35
Michigan	Plums and prunes	9	38	19	35
Michigan	Raspberries	8	36	24	32
Michigan	Sweet cherries	19	10	33	37
Michigan	Tart cherries	15	16	31	38
New York	Apples	5	6	21	68
New York	Grapes	33	19	28	19
New York	Peaches	9	21	34	36
New York	Pears	4	18	38	40
New York	Tart cherries	18	26	18	37
North Carolina	Apples	7	12	40	41
North Carolina	Peaches	1	20	66	13
Oregon	Apples	5	9	19	67
Oregon	Grapes	29	28	31	11
Oregon	Plums and prunes	21	19	29	31
Oregon	Raspberries	27	25	15	32
Oregon	Sweet cherries	17	20	31	32
Pennsylvania	Apples	3	9	16	72
Pennsylvania	Peaches	3	15	15	67
Pennsylvania	Tart cherries	9	8	6	77
South Carolina	Apples	1	15	12	71
South Carolina	Peaches	9	28	40	23
Virginia	Apples	3	7	8	82
Virginia	Peaches	5	18	13	63
Washington	Apples	4	18	18	60
Washignton	Grapes	43	14	17	25
Washington	Peaches	23	22	22	33
Washington	Pears	10	23	18	50
Washington	Plums and prunes	31	48	9	12
Washington	Raspberries	3	22	7	68
Washington	Sweet cherries	15	34	23	28
Total 2/		17	21	18	44

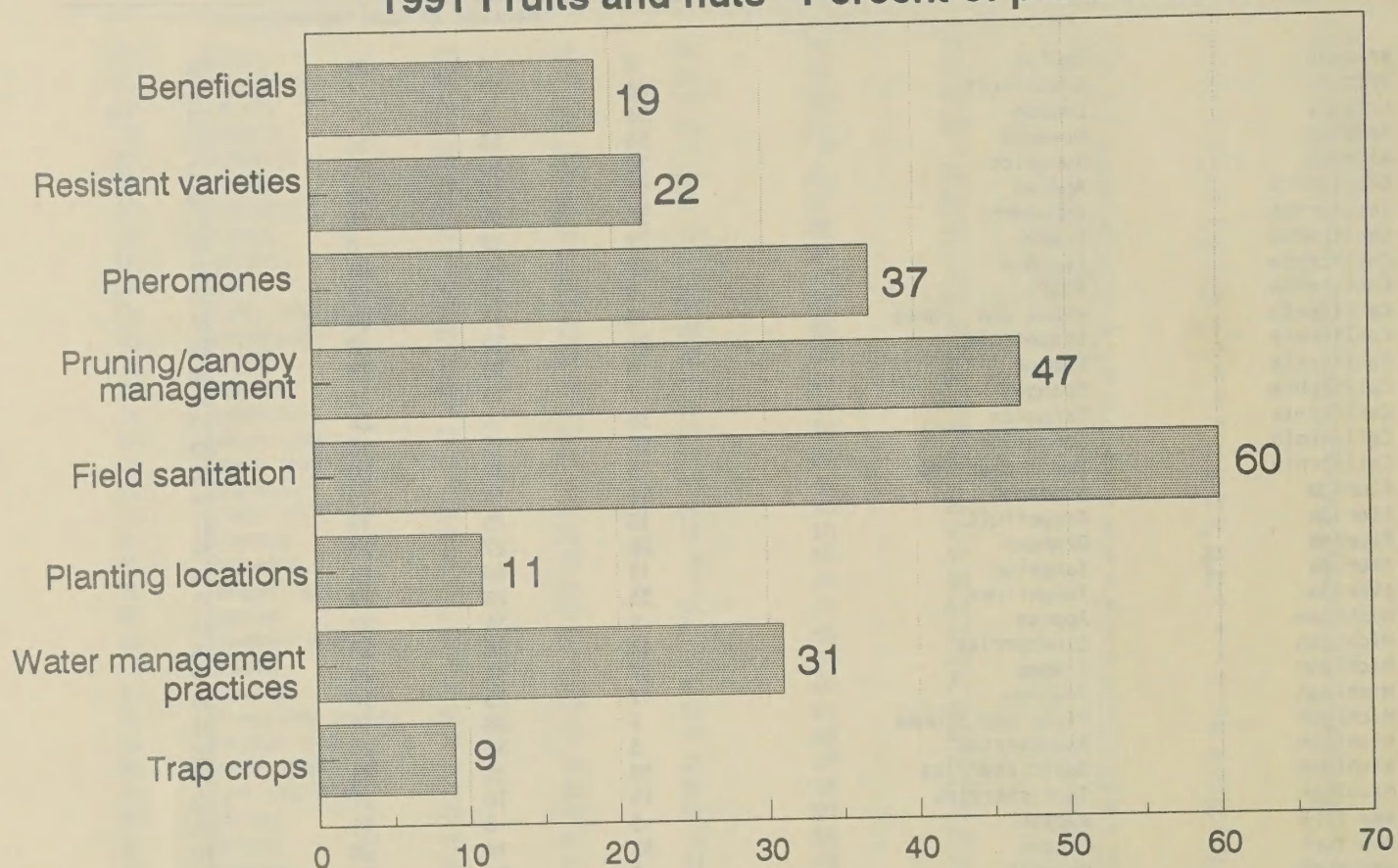
1/ Including use of the following practices for pest management: beneficials, resistant varieties, pheromones, pruning and canopy management, field sanitation, planting locations, water management practices, and trap crops.

2/ Total includes all surveyed fruit and nut crops and States, some of which are not listed in the table.

Source: NASS/ERS 1991 Fruit and Nut Chemical Use Survey.

Alternative pest management practices

1991 Fruits and nuts - Percent of planted acres



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